THE CLAIMS

1. A magnetic memory device comprising:

first and second ferromagnetic layers, each ferromagnetic layer having a magnetization that can be oriented in either of two directions, the first ferromagnetic layer having a higher coercivity than the second ferromagnetic layer; and

a structure for forming a closed flux path with the second ferromagnetic layer.

2. The device of claim 1, wherein the structure includes a conductor clad with ferromagnetic material, portions of the ferromagnetic material in magnetic communication with the second ferromagnetic layer.

3. The device of claim 2, wherein all but a surface of the conductor is clad, wherein the unclad surface is in direct contact with the second ferromagnetic layer.

4. The device of claim 2, wherein portions of the ferromagnetic material define a magnetic gap, the portions in direct contact with the second ferromagnetic layer.

5. The device of claim 1, wherein the first layer is a data layer, and the second layer is a reference layer.

6. The device of claim 5, wherein the data layer and the reference layer are made of at least one of different shapes, thickness and ferromagnetic materials.

7. The device of claim 1, further comprising an insulating tunnel barrier between the ferromagnetic layers.

8. The device of claim 1, further comprising a non-magnetic metallic layer between the ferromagnetic layers.

9. A method of performing a read operation on the device of claim 1, the method comprising:
setting the magnetization orientation of the second layer in a first direction;
determining a resistance state of the device;
setting the magnetization orientation of the second layer in a second direction;
determining a resistance state of the device; and
examining the change in resistance states.

10. The method of claim 9, wherein the change is examined by determining the direction of resistance state transition.

11. A device comprising:
a magnetic tunnel junction including first and second ferromagnetic layers; and
means for forming a closed flux path with one of the ferromagnetic layers.

12. A structure for a magnetic memory device including a ferromagnetic layer, the structure comprising:
an electrical conductor; and
ferromagnetic cladding on the conductor, the ferromagnetic cladding forming a closed flux path with the ferromagnetic layer.

13. The structure of claim 12, wherein all but a surface of the conductor is clad, wherein the unclad surface is in direct contact with the ferromagnetic layer.

14. The structure of claim 12, wherein portions of the ferromagnetic cladding define a magnetic gap, the portions in direct contact with the ferromagnetic layer.

15. The structure of claim 12, wherein the ferromagnetic layer is a reference layer, whereby the cladding forms a closed flux path with the reference layer of the magnetic memory device.

16. A data storage device comprising:

an array of magnetic memory cells, each memory cell including a data ferromagnetic layer and a reference ferromagnetic layer;

a plurality of first traces extending in a first direction, each first trace in contact with a group of data layers; and

a plurality of structures extending in a second direction, each structure forming closed flux paths with a group of reference layers.

17. The device of claim 16, wherein the ferromagnetic layers have magnetizations that can be switched between first and second directions during write operations, only the reference layers being switchable between first and second directions during read operations.

18. The device of claim 16, wherein the first direction is roughly orthogonal to the second direction.

19. The device of claim 16, further comprising a circuit for setting the magnetization orientation of the reference layer of a selected memory cell in a first direction, determining a resistance state of the selected memory cell, setting the magnetization orientation of the reference layer of the selected memory cell in a second direction, determining a resistance state of the selected memory cell, and examining the change in resistance states of the selected memory cell.

20. The device of claim 19, wherein the circuit examines the change by determining the direction of resistance state transition.

21. The device of claim 19, wherein the circuit determines the resistance state of a selected memory cell by applying a potential to a structure crossing the selected memory cell; and supplying an equal potential to a subset of structures and traces not crossing the selected memory cell.

22. The device of claim 16, wherein each structure includes a conductor clad with ferromagnetic material, portions of the ferromagnetic material in magnetic communication with a group of reference layers.

23. The device of claim 22, wherein all but a surface of each conductor is clad, wherein the unclad surface of each conductor is in direct contact with a group of reference layers.

24. The device of claim 22, wherein portions of the ferromagnetic material define a magnetic gap over each conductor, the portions in direct contact with a group of reference layers.

25. The device of claim 22, wherein a dielectric layer electrically insulates at least one structure from its corresponding group of reference layers, and wherein electrically conductive, magnetically non-conductive segments extends between reference layers.

26. A method of reading a selected memory cell in the device of claim 16, the method comprising:

applying spaced apart first and second pulses to the selected memory cell, the first and second pulses having opposite polarity; and

examining a transition of resistance states of the selected memory cell.